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Intrahepatic-Cutaneous Biliary Fistulas Secondary to Trauma†

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Biliary fistula is an unusual complication after operations for hepatic trauma, but only scant information is available concerning its management. This report describes biliary fistulas and presents two cases of their successful resolution, by external drainage in one case and internal drainage in the other. These cases illustrate aspects of fistula management and prevention described in the literature and suggest individualized approaches.

Biliary fistula occurs in less than 5% of patients reported in large series of liver trauma (Table I). While its prevention or control by use of a T-tube has been an exciting, controversial issue in liver trauma, only scant information is available about its management, particularly when subdiaphragmatic biliary egress is from a major intrahepatic biliary duct.

Early postoperative drainage of bile, which is transient when present and usually disappears within a few days, should be distinguished from a biliary fistula. We define a biliary fistula as: 1) the persistent drainage of gross bile two weeks or more after injury, and accompanied by 2) a demonstrable communication with the biliary system.

The following cases describe two approaches which led to successful resolution.

TABLE I

Biliary Complications Following Liver Trauma

Author	No. Cases	Bile Peritonitis	Biliary Fistula
* Mikesky et al 1956 (1)	300	4 (2)**	7 (0)**
* Crosthwait et al 1962 (2)	640		17 (0)**
Lucas et al 1972 (3)	304	1 (1)**	4 (0)**
Carroll et al 1973 (4)	244		11 (0)**
Trunkey et al 1974 (5)	810	3 (0)**	5 (0)**
Lim et al 1976 (6)	681		3 (-)**
* DeFore et al 1976 (7)	1590		42 (0)**
Fischer et al 1978 (8)	254	5 (-)**	

* Consecutive series from same institutions

** Indicates mortality

Case Reports

Case 1

An 18-year-old woman fell from a horse, striking her right lower thorax against a tree stump. A right thoracostomy tube was placed for a pneumothorax, and she was transferred to Henry Ford Hospital for further evaluation.

When admitted she was pale and lethargic. Her blood pressure was 100/74 and pulse 100; hemoglobin was 12.4 and WBC was 36,000. Her abdomen was tense and tender in the right upper quadrant. Laparotomy revealed large stellate lacerations involving most of the right lobe of the liver but no other intra-abdominal injury. Extensive debridement of the right lobe was necessary for hemostasis. Multiple individual ligatures and Avitene controlled hemorrhage following debridement. No T-tube was used. Penrose and sump suction drains were brought out the right flank. She had received 27 units of blood by the time the operation was completed.

Postoperatively, serosanguinous drainage (as much as 150 cc/hr) decreased over the next several days and by the second week had become grossly purulent, although the amount continued to diminish. The patient was discharged on antibiotics with a flank drain in place.

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Purulent drainage persisted, but the patient was otherwise asymptomatic. Six months postoperatively, a sinogram showed a subphrenic abscess cavity (Fig. 1). A #8 French catheter was placed through the drain site into the cavity and b.i.d. irrigations were instituted. The drainage became less purulent and more bilious (golden); it persisted for three months. Nine months postoperatively, a sinogram revealed no cavity, but a fistulous communication with a normal biliary system and free flow into the duodenum (Fig. 2). Over the next month, the drainage decreased and the tube was shortened. No drainage has occurred since the tube was removed in the tenth postoperative month.

Comments: The amount of serosanguinous drainage shortly after the operation was more than is usually seen after this type of injury. Inability to achieve a drier liver surface may have contributed to the development of this complication. Irrigation of the cavity allowed controlled drainage of the infection. Later, the associated biliary communication became manifest. We believe that an otherwise normal biliary system and a cooperative patient, willing to pursue this form of nonoperative management, both helped in the eventual healing.

Case 2

A 17-year-old man entered the hospital with two gunshot wounds. One bullet had entered the medial segment of the left lobe of the liver, exited at the posterior segment of the right lobe, and was retrieved from the right hemidiaphragm. Minor bleeding from the right lobe was controlled with several sutures. No drainage from the left lobe was identified, and the diaphragm was repaired. The second bullet, which lodged in the left ileopsoas muscle, caused many small and large bowel perforations. Small bowel resection, colostomy, and mucous fistula were performed, and drains were placed in the left retroperitoneum.

Initial biliary drainage ceased after four days, and all drains were removed. Two weeks later, the patient developed progressive ileus, fever, abdominal distention, and leukocytosis. Peritoneal aspiration yielded 300 cc of bile. Laparotomy on the 17th day revealed golden bile within the peritoneal cavity and no gross purulence. An operative cholecystostomy cholangiogram showed disruption of the left hepatic bile duct near its confluence with the right hepatic duct (Fig. 3). Glisson's capsule held sutures securely and permitted a Roux-en-Y antecolic hepatojejunostomy.

A sump tube was placed retrograde through the jejunal limb into the bullet tract. Cholecystostomy and flank drainage of the abdomen completed the procedure. The jejunostomy sump tube (Fig. 4) was removed after three weeks and the cholecystostomy tube after six weeks. The patient underwent colostomy closure four months later and has continued asymptomatic.

Comments: There was no identifiable biliary drainage and only slight hemorrhage from the liver during the first operation. Better local drainage initially may have influenced the development of this complication. Since intrahepatic ductal disruption was in an area relatively inaccessible to direct repair, the alternative of resection would have been formidable. The considerable reaction of Glisson's capsule to the nonpurulent bile peritonitis allowed anastomosis of the small bowel to the liver itself.

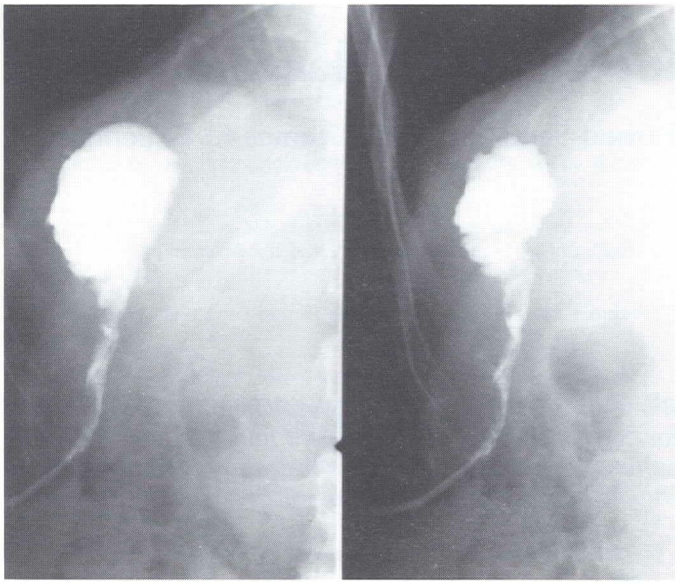

Fig. 1
Sinogram six months postoperatively shows a right subphrenic abscess cavity.

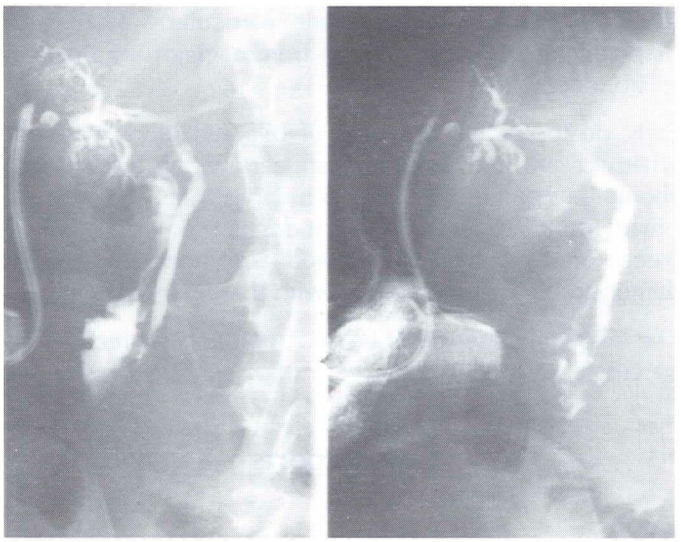

Fig. 2
Sinogram nine months postoperatively shows a fistulous communication with a normal biliary system, free flow into the duodenum, and no subphrenic cavity.

Discussion

Visual identification of gross bile at the external drain site(s) is unusual following operations for liver trauma. If bile drainage occurs in the postoperative period, it usually disappears within a few days, and subsequent healing is uneventful. A biliary fistula is distinguished from transient bile drainage by: 1) the persistent drainage of gross bile two

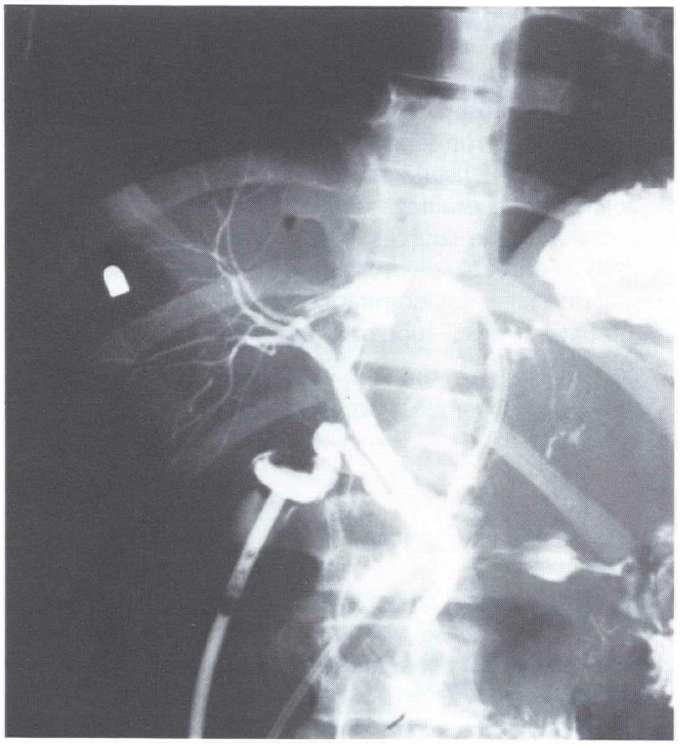

Fig. 3
Operative cholecystostomy cholangiogram shows disruption of the left hepatic duct in the medial segment of the left hepatic lobe of the liver, an otherwise normal biliary system, and flow of contrast into the abdominal cavity.

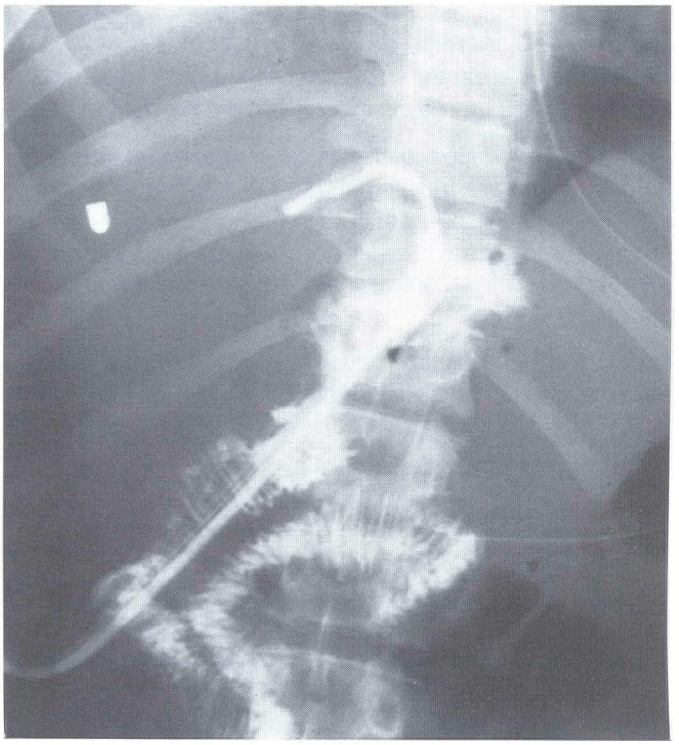

Fig. 4
Postoperative cholangiogram through a jejunostomy tube shows a patent hepatojejunostomy and no leakage into the abdomen.

weeks or longer after injury; and 2) a demonstrable communication with the biliary system.

The incidence of biliary peritonitis and fistula (Table I) has been reported to vary from 2-4% in many large series of hepatic trauma. Mikesky, et al (1) found that the undrained wounds were those originally believed to be minimal; yet they resulted in deaths of 9% of patients, one of the causes being bile peritonitis.

Adequate external drainage allows resolution of most biliary fistulas within a few months without additional operations. Such drainage is also a primary surgical objective in managing other biliary complications of liver trauma, such as bile peritonitis, thoracobiliary fistulas (9), and biliary cysts (10,11). Similarly, hepatostomy drainage of central hepatic hematomas has been followed by a biliary fistula, which resolved with continued external drainage (11,12).

In rare instances, external biliary fistulas persist for years (5) or are accompanied by significant morbidity (13). Success in isolated instances has followed direct intrahepatic biliary repair (14) or internal drainage via a Roux-en-Y hepaticojejunostomy (13). External drainage and common duct intubation were also used in those patients.

Identification of methods to prevent a biliary fistula has been more elusive. It has been known for some time that hepatic injuries which appear trivial at the time of operation may yield significant bile drainage postoperatively (1, 15). A more meticulous debridement to achieve bile and hemostasis has been emphasized in studies during times in which morbidity and mortality from isolated liver injuries per se were decreasing (1,5,15).

In 1963, biliary intubation either by cholecystostomy or T-tube choledocostomy was suggested by Meredino, et al (10) as a method to prevent biliary fistula after operations for hepatic trauma. Madding and Kennedy (17) emphasized external drainage but also recommended biliary decompression by use of a T-tube in the common duct "to obviate bile accumulations in the injured liver surface in the treatment of all patients with anything more than minimal hepatic injuries." In a review of penetrating injuries from the Vietnam war, Carroll, et al (18) felt that T-tube drainage was helpful in the postoperative diagnosis of certain complications, but at the same time they did not find any increase in complications due to its use. Others (19) have raised doubts about the efficacy and harmlessness of routine biliary intubation. In a prospective study, Lucas

and Ledgerwood (20) reported three cases of biliary cutaneous fistula in spite of controlled extrahepatic biliary drainage and strongly suggested that biliary drainage is associated with increased morbidity and mortality.

Operative cholangiography has been advocated to identify major bile leakage in trauma (21, 22). Lack of widespread adoption reflects, perhaps, the adverse circumstances involving these procedures, the infrequency of significant coexistent biliary pathology, and the low incidence of this clinical problem.

The decision to treat a biliary fistula by internal or external drainage should be determined on a case-by-case basis. We believe that if the patient shows no clinical evidence of sepsis due to the fistula, and if the amount of drainage is minimal to moderate, external drainage is preferred and will suffice for most patients. However, if the patient shows signs of toxemia or sepsis in spite of adequate external drainage, or if the fistula persists for many months without healing, internal drainage should be considered. Among these patients, the sources of fistula should be identified precisely in order to select the most appropriate method for internal drainage. Concomitant external drainage and biliary intubation by a T-tube or cholecystostomy should also be considered.

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